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Rhinopoma microphyllum.

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Rhinopoma microphyllum (Brünnich, 1782)

Larger Mouse-tailed Bat

Vespertilio microphyllus Brünnich, 1782:50. Type locality "Arabia and Egypt," restricted to Pyramids of Giza, Egypt (Aellen, 1957; Anderson and de Winton, 1902; Kock, 1969).

Rhinopoma lepsianum Peters, 1859:222. "Blue Nile." Kock (1969: 58) designated a lectotype from the White Nile, Sudan. Koopman (1975) restricted the type locality to Khartoum, Sudan.

Rhinopoma cordofanicum Heuglin, 1877:24. Type locality Arashkol Mts., Sudan. According to Koopman (1975:367), on west side of the White Nile at approximately 14°15′N, 32°10′E.

CONTEXT AND CONTENT. Order Chiroptera, Suborder Microchiroptera, Family Rhinopomatidae. The family includes a single genus with three species. For a synopsis and key to species, see Qumsiyeh and Jones (1986). *Rhinopoma microphyllum* includes six recognized subspecies (Hill, 1977; Nader and Kock, 1983). These are listed and the type localities given as follows:

R. m. microphyllum Brünnich, 1782:50. Type locality and synonymy above.

R. m. sumatrae Thomas, 1903:497. Balighe, near Lake Taba, NW Sumatra.

R. m. kinneari Wroughton, 1912:767. Bhuj, Cutch, India.

R. m. tropicalis Kock, 1969:58. Jebel Talao, 2 km NE of Kadogli, Kordofan, Sudan. Most likely a synonym of *R. m. microphyllum*. If a valid subspecies, *lepsianum* or *cordofanicum* may have priority.

R. m. harrisoni Schlitter and DeBlase, 1975:658. 10 km SE of Kazerun, Fars Province, Iran, 29°34′N, 51°46′E.

R. m. asirensis Nader and Kock, 1983:148. Al Jowa, about 37 km E Abu Arish, SW Saudi Arabia, 17°00′N, 43°03′E.

DIAGNOSIS. *Rhinopoma microphyllum* is distinguished from *R. hardwickii* and *R. muscatellum* by its large size. The greatest length of skull is 18–22 mm and the forearm measures 57–72 mm. For both *R. hardwickii* and *R. muscatellum*, the forearm length measures 46–63 and skull length 14–19 mm (Qumsiyeh and Jones, 1986). The tail is, however, proportionally shorter (usually shorter than forearm). The skull is robust, with well developed lambdoidal and sagittal crests. The lacrimal region of the skull is not as inflated as in *R. hardwickii* and *R. muscatellum*. The superior transverse dermal ridge surrounding the narial pad is not well developed in this species (almost flat). The posterior margin of the bony hard palate is triangular and not rounded as in the two smaller species. The apex of the mesopterygoid space is triangular (rounded in *R. hardwickii*). The tympanic bullae is relatively smaller than in *R. hardwickii* and *R. muscatellum*. In a recent review of the family, van Cakenberghe and de Vree (1994) recognized *Rhinopoma macinnesi* as a valid species related to *R. hardwickii* and *R. muscatellum* and described a new subspecies of *R. hardwickii* (*R. h. sondaicum*). The latter review and this account complement the earlier account of *R. hardwickei* (sic) and *R. muscatellum* (Qumsiyeh and Jones, 1986).

GENERAL CHARACTERS. *Rhinopoma microphyllum* is a medium-sized bat with a free tail. The face is glandular and the ears are connected across the forehead. The muzzle shows a small and indistinct noseleaf terminally (Fig. 1). The eyes are well developed. The pinna is large and has ten transverse ridges. The tragus is well developed. The feet are slender, but larger than in *R. hardwickii*. The plagiopatagium is broad and forms most of the wing membrane. The manus supports relatively little of the wing membrane. The interfemoral membrane is small and encloses less than one fourth of the tail. Short hair is sparsely distributed on the upper throat, muzzle and upper lip. The dorsal and ventral pelage is fine and short, measuring about 5 mm. It is a unicolored pale gray-brown dorsally. Ventrally, the color of the pelage is pale (Harrison, 1964; Miller, 1907). The scales of the hairs in this genus are conspicuous and very different from other species of bats (Gaisler and Barus, 1978). Hair scales are described as "divergent to divaricate, hastate to lobate, with distinct lobules; very probably both coronal and imbricate scales are represented" (Gaisler and Barus, 1978:213). The skin covering the lower back and venter is naked, often showing the yellow color of the substantial fat deposits present during the autumn (Harrison, 1964; Miller, 1907).

The skull is short with an oval braincase and a short rostrum (Fig. 2). Even though the skull of this species is the most heavily built of the three species in the genus, the cranial bones are delicate. The tympanic bone is loose. The widest part of the skull is at the squamosal branch of the zygomatic arch. The lacrimal region of the skull is almost flat. The dental formula is i 1/2, c 1/1, p 1/2, m 3/3, total 28.

Ranges in selected external and cranial measurements (Hill, 1977; Nader and Kock, 1983; Schlitter and DeBlase, 1975) for *Rhinopoma microphyllum* are (in mm): total length, 111–147; length of tail, 41–63; length of forearm, 57–75; greatest length of skull, 18.4–22.1; zygomatic breadth, 10.8–13.5; breadth of braincase, 7.8–9.2; and length of toothrow (C–M3), 6.4–7.9.

DISTRIBUTION. *Rhinopoma microphyllum sumatrae* is

FIG. 1. Drawing of *Rhinopoma microphyllum* from a live specimen from Jordan.

FIG. 2. Dorsal, ventral and lateral views of cranium and lateral view of mandible of *Rhinopoma microphyllum* (TTU 40523, male) from Jordan. Greatest length of skull is 20.7 mm.

known only from the type locality in northern Sumatra (Figs. 3, 4). *R. m. kinneari* occurs in western and central India. Historical records from Burma, Malaya and Thailand likely belong to other species. The nominate subspecies is known from southern Pakistan through Iran and Arabia to Morocco in the west and to Sudan in the south. *R. m. tropicalis* is known from southern Kordofan, Sudan, Senegal, Mauritania and central Nigeria. *R. m. harrisoni* occurs in southern Iran southeastward to 10 km WNW Bustak. Finally, *R. m. asirensis* is known only from the Asir province of SW Saudi Arabia (Hill, 1977; Kock, 1969; Qumsiyeh, 1985). No fossil rhinopomatids are reported.

FORM. The skull is broad and slender. Sagittal and lambdoidal crests are well developed, especially in males. The nasal inflations are not pronounced. However, the vomeronasal organ is well developed and with an exceptionally broad nasal septum (Cooper and Bhatnagar, 1976). The ear ossicles and tympanic bone were compared to other Egyptian bats by Wassif (1946, 1948) and Madkour (1977). In *R. microphyllum*, as in *R. hardwickii*, the malleus has a prismatic head, the incus has a short and broad crus brevis, and the stapes is small. The tympanic bone is loosely attached to the skull and is horseshoe-shaped. The cochlea has three turns. The coronoid and angular processes of the mandible are well developed. The upper pair of incisors are minute, barely emerging from the gum. Canines are conical and simple. Upper premolars (PM4) are small. First and second upper molars are without distinct hypocones; third upper molar has a metacone, mesostyle and three commisures. Lower incisors are small; posterior lower premolar (pm4) is wider than anterior one and moderately trifid (Harrison, 1964; Wassif and Madkour, 1963).

The vertebral column consists of 7C, 12T, 6L, 4S, and 17Ca. The coracoid process of the scapula is "hook" shaped and ossifies independently (Wassif and Madkour, 1963). The hyoid bone in this species is larger than that in *R. hardwickii*. The stenohyoid is club-shaped and the thyrohyals are convex posteriorly. The thyroid is entirely cartilaginous while the cricoid is bony and fused with the first tracheal ring (Wassif and Madkour, 1970*a*). Tracheal rings are incomplete and bony (Wassif and Madkour, 1970*a*). The humerus in *R. microphyllum* has a small median epicondyle but a larger capitulum than that in *R. hardwickii* (Madkour, 1978).

Two phalanges are found in all forearm fingers except the first in both *R. microphyllum* and *R. hardwickii* (Wassif and Madkour, 1970*c*, 1974). The presternum is wide and in adults, the sternal part of the rib fuses with the manubrium sterni. The sternum in *R. microphyllum* is larger than that of *R. hardwickii* and shapes of both the mesosternum and manubrium sterni show interspecific differences (Wassif and Madkour, 1970*b*). The ilium is about three times as long as the ischium and the pubis lacks a symphysis in *Rhinopoma microphyllum*. Four vertebrae fuse together to form the sacral-pseudosacral region. The os penis is "racket" shaped but varies in size and shape with age (Wassif and Madkour, 1963, 1972*a*). The osteology of this species in India was found to be essentially similar to that for Egyptian specimens discussed above (Sinha, 1982).

In both *R. hardwickii* and *R. microphyllum*, large filiform papillae occupy a relatively small, triangular area on the tongue partly surrounding the three circumvillate papillae (Madkour, 1976; Wassif and Madkour, 1972*c*). The alimentary tract is no different superficially from other Egyptian Microchiroptera (Madkour, 1976). The length of the intestine in this species is relatively longer, representing 132.5% of the head and body length, than in *R. hardwickii* (Madkour, 1976). In this species, the palatal rugae include a large oval precanine ruga and a relatively large (relative to other Egyptian bats examined) ruga in the canine area (Wassif and Madkour, 1972*b*).

Females have the normal pair of pectoral mammary glands and teats, but also have a pair of pelvic teats without mammary glands (Madkour, 1976). Testes lie permanently within the abdomen (Kumar, 1965). The baculum is described as small (1–1.1 mm in length), flat, ventrally concave, and resembling an "elongated arrowhead" (Sinha, 1976).

FUNCTION. Water metabolism in *Rhinopoma* reflects extreme desert adaptation. Urea concentration in the blood was 4–5 times higher than in humans. A short gut and smaller kidneys were seen in *Rhinopoma* as compared to *Rhinolophus*. This is counteracted by a skin that is much less capillarized and shows little perspiration even at high temperatures. It appears that *Rhinopoma* does little to regulate its body temperature (Vogel, 1969).

Flight consists of a series of "alternating flutters and glides, with a rising and falling motion giving a superficial resemblance to that of a small bird from a distance" (Harrison, 1964:62). Under laboratory conditions, echolocation sounds consisted of frequency modulated (FM) sounds with five to seven harmonics. Sound intensity increased in response to acoustic activity of conspecifics in group flight (Schmidt and Joermann, 1983, 1986).

ONTOGENY AND REPRODUCTION. The larger mouse-tailed bat is a monotocous and monovular species (Brosset, 1962; Gopalakrishna and Badwaik, 1993; Kumar, 1965; Prakash, 1960). In India, testes reach maximum size by late January and remain large through March. Copulation occurs around March, followed by a gestation period estimated at 123 days (104 days according to

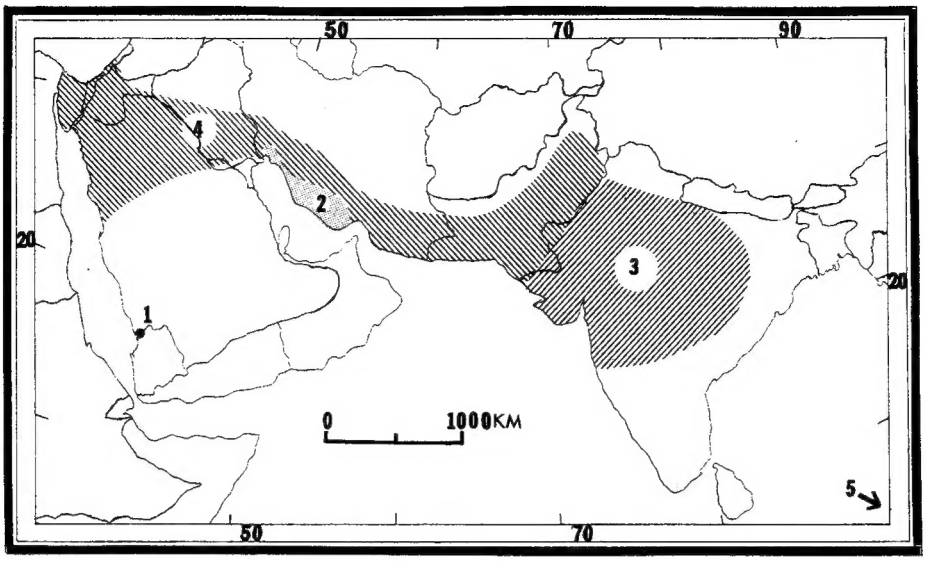

FIG. 3. Asian distribution of subspecies of *Rhinopoma microphyllum:* 1. *R. m. asirensis*; 2. *R. m. harrisoni*; 3. *R. m. kinneari*; 4. *R. m. microphyllum*; 5. *R. m. sumatrae* (known only from Sumatra).

Gopalakrishna and Badwaik, 1993). Parturition occurs in June to August and a single young is born with a maximum weight of 5 g. Young are weaned in September after nursing 4 weeks. Deciduous teeth form minute spicules replaced by a permanent set early (Wassif and Madkour, 1963). Maturity is achieved in 18–19 months in both males and females (Gopalakrishna and Badwaik, 1993). Pelvic and pectoral teats develop only during the first pregnancy (Kumar, 1965).

In *R. microphyllum,* the placenta is formed extensively, but gradually becomes confined to the mesometrial side. The placental labyrinth is lamellar and the "endothello-chorial" type of placenta is like that in the Rhinolophidae and Molossidae (Srivastava, 1952). Hormones affect reproduction in a similar fashion as in other bats (Ramaswami and Kumar, 1966).

ECOLOGY AND BEHAVIOR. *Rhinopoma microphyllum* is a xerophilous species inhabiting caves, ruins, mosques, temples, tunnels, and old houses. It often occurs together with *R. hardwickii* at the same roosting sites but in lower numbers than the latter. In India, however, *R. microphyllum* may be more common than *R. hardwickii* and is sometimes the most common species of bat encountered (Advani, 1981, 1982*b*). Individuals may hang singly on the sides of their roosts in some areas and may congregate by the thousands at other sites. *R. microphyllum* may be alert all year (Gaur, 1980) or may undergo winter torpor (Kumar, 1965). Disturbed large mouse-tailed bats wag their tails in a pendulum like fashion. They also exhibit a restless behavior for 2–2.5 h before exiting their roosts for foraging. Large mouse-tailed bats may change their roosting sites and possibly migrate, before and after a period of torpor in the winter (late October to late February or early March). During this over-wintering period, they draw on stores of fat deposited in the abdominal region (Kumar, 1965; Poulet, 1970).

During winter, body mass of adult males ranges from 40 to 45 g and of adult females 30 to 35 g. After resorption of stored fats, these masses drop to 32–35 g for males and 28–33 g for females (Kumar, 1965). Gaur (1980) provided some anecdotal remarks on the roosting ecology of *R. m. kinneari.* The time of emergence of

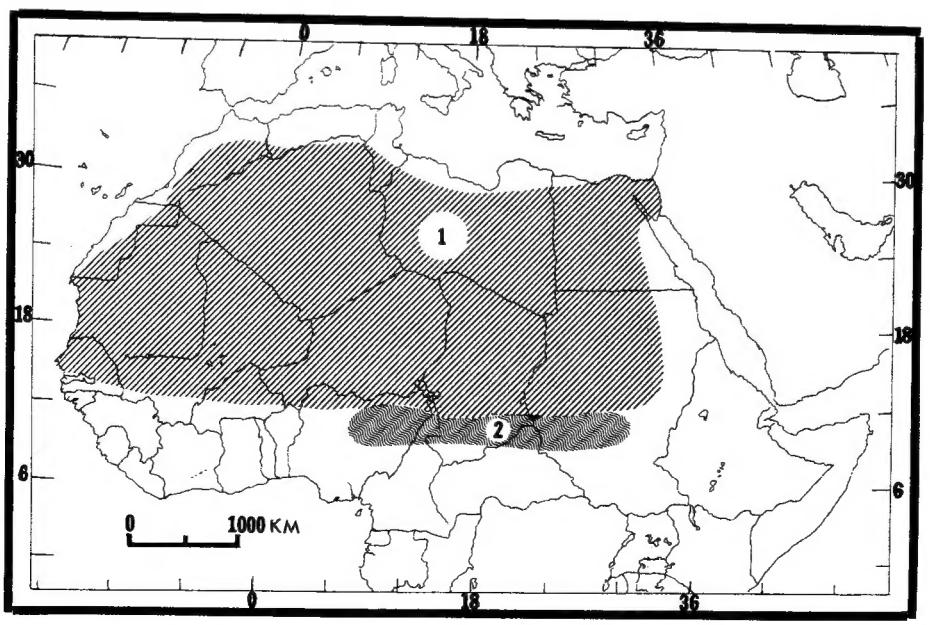

FIG. 4. African distribution of subspecies of *Rhinopoma microphyllum*; 1. *R. m. microphyllum*; 2. *R. m. tropicalis.*

bats correlated well with time of sunset and abundance of insects (Advani, 1982*b*). During summer months (May–August) emergence preceded sunset by as much as 30 min in the Rajasthan of India (Advani, 1982*b*). In Iran, where *R. m. harrisoni* and *R. m. microphyllum* occur near each other, the latter is found at higher elevations with cooler climates (Schlitter and DeBlase, 1975).

In India, *Rhinopoma microphyllum* was the most common species of bats sampled in rocky or arid habitats but was absent in forested regions (Advani, 1982*a*, 1982*c*). Sinha (1981) stated that the lower density of the skull in *Rhinopoma* is related to feeding on soft insects like termites and dipterans. However, actual investigations of stomach contents do not support this assertion. Poulet (1970) examined three stomachs from *R. microphyllum* and found an abundance of Coleoptera (scarabids, tenebrionids and curculionids) with a few Hemipteran remains. In the Rajasthan desert, *R. m. kinneari* consumes Coleoptera, Lepidoptera, and Orthoptera throughout the year, while Hymenoptera is consumed in all seasons but winter (Advani, 1981). Other foods taken at various times include Isoptera, Neuroptera, and Dictyoptera. Food items included many agricultural pest insects, highlighting the importance of conserving this species and other insectivorous bats.

Homing instincts are well developed in this species (Wason, 1978; Wason and Misra, 1981). At longer distances (15–30 km), homing was more successful from some directions (especially east) than from others.

Three skulls of "*R. microphyllum*" (most probably mis-identified *R. hardwickii*) were found in barn owl (*Tyto alba*) pellets in Palestine (Dor, 1947). Dipteran parasites on this species include the streblids *Brachytarsina flavipennis* and *B. diversa* and the nycteribiid *Nycteribia pedicularia* (Kock, 1983). A new species, *Brachytarsina sinhai*, was described from *R. microphyllum kinneari* (Vazirani and Advani, 1976). Hoogstraal and Traub (1963) found no fleas on 50 specimens examined from Egypt, but mentioned that the type specimen of *Ischnopsillus consimilis* was taken from *R. microphyllum* near Cairo. A physalopterid nematode, *Mirzaloptera babari*, was described from *R. microphyllum kinneari* (Wason and Johnson, 1977). Saoud and Ramadan (1976) reported two trematode genera (*Prosthodendrium* and *Anchitrema*) that parasitized this species in Egypt, but no nematodes or cestodes.

GENETICS. *Rhinopoma microphyllum* shows a diploid number of 42 and a fundamental number of 66 based on specimens from Jordan. The X chromosome is a medium-sized metacentric and the Y chromosome is assumed to be a small acrocentric (no males were examined). Based on G-band studies, the karyotype of *R. hardwickii* (diploid number 36, fundamental number 68) differs from that of *R. microphyllum* by three Robertsonian rearrangements and two inversions. Heterochromatin is restricted to the centromeric region on all chromosomes (Qumsiyeh and Baker, 1985). Albinism was reported in *R. m. kinneari* (Bhat, 1988).

REMARKS. The number of subspecies in this morphologically variable species may be fewer than listed. *Rhinopoma m. kinneari* is possibly a synonym of *R. m. sumatrae* and *R. m. asirensis* of *R. m. microphyllum*, but records from intervening areas in each case are still lacking.

G-band chromosomal homologies were found between *Macrotus waterhousii*, a primitive phyllostomid, and *Rhinopoma* (Qumsiyeh and Baker, 1985). A 5,000-year-old specimen of *Rhinopoma microphyllum* that had been mummified was found within the structure of the Dashur pyramid in Egypt (Batrawi, 1948). The name *microphyllum* is derived from *mikros* Gr. small, and *phullon* Gr., a leaf (a small leaf nose cover).

LITERATURE CITED

ADVANI, R. 1981. Food and feeding ecology of the rat-tailed bat in the Rajasthan desert. Acta Theriologica, 26:269–272.

———. 1982*a*. Distribution and status of Chiroptera species in Rajasthan, India. Säugetierkundliche Mitteilungen, 30:49–52.

———. 1982*b*. Emergence and foraging behavior of *Rhinopoma microphyllum kinneari* in Rajasthan. Säugetierkundliche Mitteilungen, 30:41–45.

———. 1982*c*. Species composition, habitat preference and relative occurrence of Chiroptera populations in south Gujarat with comparison of two major biomes. Säugetierkundliche Mitteilungen, 30:31–40.

AELLEN, V. 1957. Les chiroptères africains du Musée zoologique de Strasbourg. Revue Suisse de Zoologie, 64:189–214.

ANDERSON, J., AND W. E. DE WINTON. 1902. Zoology of Egypt: Mammalia. Revised and completed by W. E. de Winton. Hugh Rees Ltd., London, 374 pp.

BATRAWI, A. 1948. The pyramid studies: a small mummy from the pyramid of Dashur. Anatomical Reports, Annals Service of Antiquities, Egypt, 48:77–109.

BHAT, H. S. 1988. Occurence of an albino rat-tailed bat; *Rhinopoma microphyllum kinneari* Wroughton in the Indian desert. Journal of the Bombay Natural History Society, 85:608.

BROSSET, A. 1962. The bats of central and western India. Journal of the Bombay Natural History Society, 59:1–78.

BRÜNNICH, M. T. 1782. Dyrenes Histoire og Dyre-Samlingen udi Universitets Natur-Theater. Nicolaus Moller, Copenhagen, 4: 1–76.

COOPER, J. G., AND K. P. BHATNAGAR. 1976. Comparative anatomy of the vomeronasal organ complex in bats. Journal of Anatomy, 122:571–601.

DOR, M. 1947. Observations sur les micromammiferes trouves dans les pelotes de la Chouette Effraye (*Tyto alba*) en Palestine. Mammalia, 11:49–54.

GAISLER, J., AND V. BARUS. 1978. Scale structure of the hair of certain supposedly primitive bats (Chiroptera). Folia Zoologica, 27:211–218.

GAUR, B. S. 1980. Roosting ecology in the Indian rat-tailed bat, *Rhinopoma kinneari* Wroughton. Pp. 125–131, *in* Proceedings of the Fifth International Bat Research Conference (D. E. Wilson and A. L. Gardner, eds.). Texas Tech Press, Lubbock, 434 pp.

GOPALAKRISHNA, A., AND N. BADWAIK. 1993. Breeding habits and associated phenomena in some Indian bats—Part XIV (concluded). Journal of the Bombay Natural History Society, 90:1–10.

HARRISON, D. L. 1964. The mammals of Arabia. Volume I: Introduction, Chiroptera, Insectivora, Primates. Ernest Benn Limited, London, 192 pp.

HEUGLIN, T. VON. 1877. Reise in Nordost-Afrika, Schilderungen aus dem Gebiete der Beni Amer und Habab nebst zoologiscer Skizzen und einem Fuhrer für Jagdreisende. Braunschweig, 2: 304 pp.

HILL, J. E. 1977. A review of the Rhinopomatidae (Mammalia: Chiroptera). Bulletin of the British Museum (Natural History) Zoology Series, 32:29–43.

HOOGSTRAAL, H., AND R. TRAUB. 1963. The fleas (Siphonaptera) of Egypt: host parasite relationship of Insectivora and Chiroptera. Journal of the Egyptian Public Health Association, 38: 111–130.

KOCK, D. 1969. Die Fledermaus-Fauna des Sudan. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft, 521:1–238.

———. 1983. Fledermaus-Fliegen in Iran. Senckenbergiana Biologica, 63:167–180.

KOOPMAN, K. F. 1975. The bats of the Sudan. Bulletin of the American Museum of Natural History, 154:355–443.

KUMAR, T. C. A. 1965. Reproduction in the rat-tailed bat, *Rhinopoma kinneari*. Journal of Zoology, 147:147–155.

MADKOUR, G. 1976. Gross anatomy of the alimentary canal of Egyptian bats. Lynx, 18:59–72.

———. 1977. Ear ossicles and tympanic bone of some Egyptian bats (Microchiroptera). Zoologische Anzeiger, 198:263–268.

———. 1978. Significance of the distal part of the humerus in the identification of Egyptian bats. Zoologische Anzeiger, 201: 387–390.

MILLER, G. S., JR. 1907. The families and genera of bats. Bulletin of the United States National Museum, 57:1–281.

NADER, I. A., AND D. KOCK. 1983. *Rhinopoma microphyllum asirensis* n. subsp. from southwestern Saudi Arabia (Mammalia: Chiroptera: Rhinopomatidae). Senckenbergiana Biologica, 63:147–152.

PETERS, W. 1859. Neue Beitrage zur Kenntnis der Chiropteren. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1859:222–225.

POULET, A. R. 1970. Les Rhinopomatidae de Mauritanie. Mammalia, 34:237–243.

PRAKASH, I. 1960. Breeding of mammals in the Rajasthan desert, India. Journal of Mammalogy, 4:386–389.

QUMSIYEH, M. B. 1985. The bats of Egypt. Texas Tech University Press, Lubbock, 102 pp.

QUMSIYEH, M. B., AND R. J. BAKER. 1985. G- and C-band karyotypes of the Rhinopomatidae (Microchiroptera). Journal of Mammalogy, 66:541–544.

QUMSIYEH, M. B., AND J. K. JONES, JR. 1986. Rhinopoma hardwickei and R. muscatellum. Mammalian Species, American Society of Mammalogists, 263:1–5.

RAMASWAMI, L. S., AND T. C. A. KUMAR. 1966. Effect of exogenous hormones on the reproductive structures of the female bat *Rhinopoma* during the non-breeding season. Acta Anatomica, 63:101–123.

SAOUD, M. F. A., AND M. M. RAMADAN. 1976. Studies on the helminth parasites of bats in Egypt and the factors influencing their occurrence with particular reference to digenetic trematodes. Zeitschrift für Parasitenkunde, 51:37–47.

SCHLITTER, D. A., AND A. F. DEBLASE. 1975. Taxonomy and geographic distribution of *Rhinopoma microphyllum* (Chiroptera: Rhinopomatidae) in Iran, with the description of a new subspecies. Mammalia, 38:657–665.

SCHMIDT, U., AND G. JOERMANN. 1983. Untersuchungen zur echoortung in gruppenflug bei Mausschwanzfledermäusen (*Rhinopoma microphyllum*). Zeitschrift für Säugetierkunde, 48:201–210.

———. 1986. The influence of acoustical interferences on echolocation in bats. Mammalia, 50:379–390.

SINHA, Y. P. 1976. Bacula of Rajasthan bats. Mammalia, 40:97–103.

———. 1981. Some ecological adaptations in skulls of bats. Geobios (Jodhpur), 8:141–144.

———. 1982. The osteology of a cave dwelling bat, *Rhinopoma microphyllum kinneari* Wroughton (Chiroptera: Rhinopomatidae) from Rajasthan. Records of the Zoological Survey of India, 79:437–455.

SRIVASTAVA, S. C. 1952. Placentation in the mouse-tailed bat, *Rhinopoma kinneari* (Chrioptera). Proceedings of the Zoological Society of Bengal, 5:104–129.

THOMAS, O. 1903. On the species of the genus *Rhinopoma*. Annals and Magazine of Natural History, Series 7, 11:496–499.

VAN CAKENBERGHE, V., AND F. DE VREE. 1994. A revision of the Rhinopomatidae Dobson 1872, with the description of a new subspecies. Senckenbergiana Biologica, 73:1–24.

VAZIRANI, T. G., AND R. ADVANI. 1976. Some ectoparasites of bats from Rajasthan (Diptera, Streblidae) with description of a new species. Oriental Insects, 10:453–457.

VOGEL, V. B. 1969. Vergleichende untersuchungen uber der wasserhaushalt von fledermäusen (*Rhinopoma, Rhinolophus* und *Myotis*). Zeitschrift für vergleichende Physiologie, 64:324–345.

WASON, A. 1978. Observations on homing ability of some insectivorous bats. Zeitschrift für Säugetierkunde, 43:305–306.

WASON, A., AND S. JOHNSON. 1977. A new physalopterid nematode from the small bat *Rhinopoma microphyllum*. Revista Brasileria Biologia, 37:563–566.

WASON, A., AND S. D. MISRA. 1981. Observations on the directional differences in homing ability of the rat-tailed bat, *Rhinopoma microphyllum* (Brunnich). Zeitschrift für Säugetierkunde, 46:331–332.

WASSIF, K. 1946. The processus muscularis and the tensor tympani muscle of bats. Nature, 157:877.

———. 1948. Studies on the structure of the auditory ossicles and tympanic bone in Egyptian Insectivora, Chiroptera and Rodentia. Bulletin of the Faculty of Science, Cairo, 27:177–213.

WASSIF, K., AND G. MADKOUR. 1963. Studies on the osteology of the rat-tailed bats of the genus *Rhinopoma* found in Egypt. Bulletin of the Zoological Society of Egypt, 18:56–80.

———. 1970*a*. The structure of the hyoid bone, larynx and upper part of trachea in some Egyptian bats. Bulletin of the Zoological Society of Egypt, 22:15–26.

———. 1970*b*. The structure of the sternum and ribs in Egyptian bats. Bulletin of the Zoological Society of Egypt, 23:39–51.

———. 1970*c*. The structure of the wing phalanges in some insectivorous bats (Microchiroptera). Ain Shams Science Bulletin, 13 (for 1969):133–144.

———. 1972*a*. The structure of the os penis in Egyptian bats (Microchiroptera). Bulletin of the Zoological Society of Egypt, 24:45–51.

———. 1972*b*. The structure of the palatal rugae in some Egyptian bats. Zoologische Anzeiger, 188:29–36.

———. 1972*c*. The tongue papillae of Egyptian bats (Microchiroptera). Bulletin of the Zoological Society of Egypt, 24:1–4.

———. 1974. The wing skeleton in Egyptian bats (Microchiroptera). Bulletin of the Zoological Society of Egypt, 26:68–78.

WROUGHTON, R. C. 1912. Some new Indian mammals. Journal of the Bombay Natural History Society, 21:767–773.

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